Examination topics of
"Clifford algebras, fermions and Dirac equation"
Jan Dereziński, Summer Semester 2022/23

1. Quaternions.
2. Algebras–ideals,classification of finite dimensional simple algebras over real and complex numbers.
3. Examples of algebras.
4. Fock spaces, creation/annihilation oprators,
5. Γ and $\mathrm{d}\Gamma$ operators, Wick quantization.
6. Exponential property of Fock spaces.
7. Clifford algebras–parity, volume element, involution.
8. Jordan-Wigner representation of Clifford algebras.
9. Fock representation of Clifford algebras.
10. Classical matrix Lie groups and their Lie algebras.
11. Spin and Pin groups.
12. Slater determinant and the "Fermi sea".
13. Many-body Schrödinger Hamiltonian and its 2nd quantized representation.
14. The Hartree-Fock method.
15. Representations of $SU(3)$.
16. Approximate flavor symmetry and applications of $SU(3)$ to particle physics.
17. Standard model and its grand unification.